Landslide problems along Highway of Central Vietnam

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The 10th International Symposium on Mitigation of Geo-disasters in Asia

Landslide problems along Highway of Central Vietnam

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Kyoto, 07th October 2012

Contents

1. Introduction

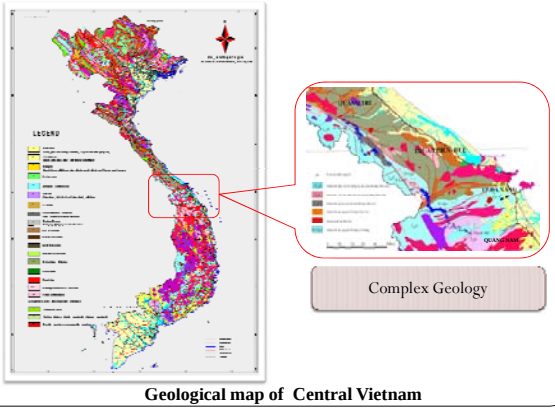
- Vietnam has an area of 331.688 km^2 and over one million km^2 of continental shelf.
- The population in 2011 was estimated at 87.84 million people.
- Three - quarters area of Vietnam is mountainous.

2. Highway system in Vietnam

- The total length of Highways in Vietnam is about 17.500 km, accounting for 8.0% of the total length of the road network.
- There are only two National Highways from the North through Central to the South of Vietnam.

Traffic map of Vietnam

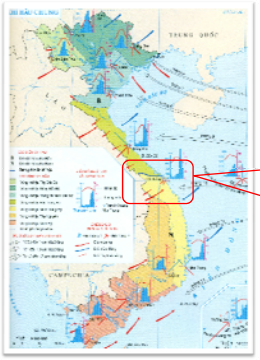
3. Geology and rainfall characteristic of Central Vietnam



Complex Geology

Geological map of Central Vietnam

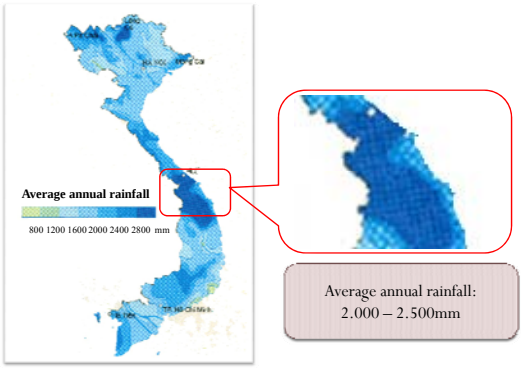
3. Geology and rainfall characteristic of Central Vietnam



In rainy reason (from September to December): 200 – 600mm

Average monthly rainfall map of Central Vietnam

3. Geology and rainfall characteristic of Central Vietnam



Average annual rainfall map of Central Vietnam

4. Landslides Problem in Central Vietnam

- Landslide is a common geo-disasters caused by natural occurrences and human activities.
- In recent years, landslides occur more and more, and their consequences are growing.
- In Vietnam, landslides mainly occur in mountain area. On 16 February 2012, a landslide occurred on National route No.6 in Hoa Binh city and took two lives.
- Each year landslides occur frequently along the highway in Vietnam, especially in Central Vietnam.
- Landslides cause serious damage to lives and property in Central Vietnam.

4. Landslides Problem in Central Vietnam

- There are about more than 200 landslides sites along highways in Central Vietnam every year.
- Estimated number of fatalities per annum due to landslide occurrence is about 30.
- About 15-kilometer highway was affected by the landslides with minimum distance of 100 m.
- Ministry of Transport have cost hundreds of billion VND (equivalent to tens of millions of USD) to repair the highways after landslide occurred in rainy season.

(According to Institute of Transport Science and Technology Ministry of Transport – Vietnam)

4. Landslides Problem in Central Vietnam

Landslide along Ho Chi Minh National Highway

4. Landslides Problem in Central Vietnam

Landslide along Ho Chi Minh National Highway

4. Landslides Problem in Central Vietnam

Landslide in Ho Chi Minh National Highway, Km399T+000

5. Conclusion

In Central Vietnam, there are some problems in landslide as follow

- ❖ Three-quarters of the area is mountainous and the terrain is complex.
- ❖ Geology is complex.
- ❖ Average annual rainfall is high.
- ❖ The landslides were triggered by the combined effect of heavy rainfalls and topographic complexity of the area, which destroyed roads, bridges and tunnels.
- ❖ My country need to develop high technology on risk assessment of landslides along the highway, especially in Central Vietnam.

6. Proposal

Analyzing the Impact of Rainfall and Geological Structures to Landslide Hazard on Slope in Central Vietnam

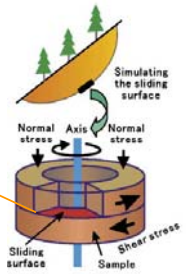
Research method

- Data collection of rainfall and geological structures in Central Vietnam;
- Laboratory test using portable dynamic undrained ring shear apparatus and direct shear apparatus;
- Model test with different rainfall intensity and geological structures in laboratory;
- Numerical simulation.

Expected results

- The effect of different geological structure on landslide with the same rainfall intensity;
- The effect of different rainfall intensity on landslide with the same geological structure;
- Obtain landslide hazard maps in Vietnam based on rainfall and geological structure;
- Establish monitoring and early warning system.

6. Proposal

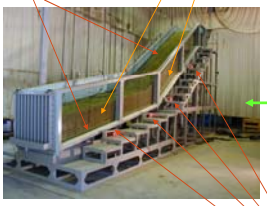


Shear ring test apparatus will be in Vietnam

6. Proposal


Pressure transducer


Marker column




Video camera


Time-code generator

Model slope apparatus will be in Vietnam

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Monitoring system will be in Vietnam